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Assistance to States in Preparing 1985 NAPAP (National Acid Precipitation Assessment Program) Emissions Inventory Submittals

Alliance Technologies Corp., Chapel Hill, NC

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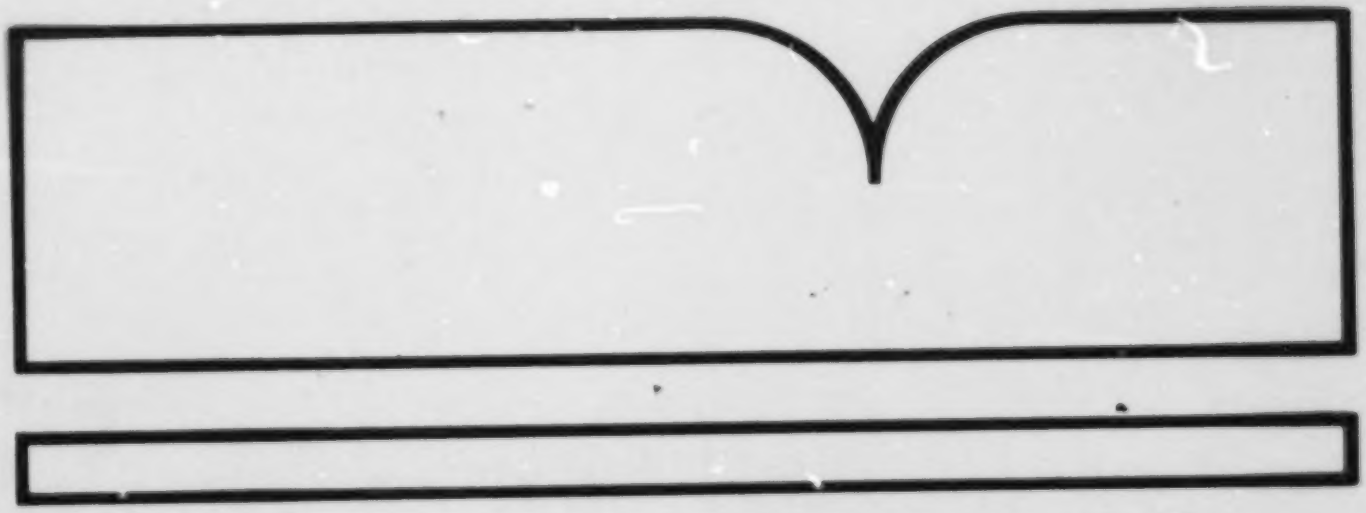

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ASSISTANCE TO STATES IN PREPARING 1985 NAPAP EMISSIONS INVENTORY SUBMITTALS

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16. ABSTRACT The paper describes the coordinated effort undertaken by the U.S. EPA to provide resources to the states for the delivery of a high quality emissions inventory within the schedule set by the National Acid Precipitation Assessment Program (NAPAP), and will be of interest to individuals concerned with the effort to quantify emissions thought to be acid rain precursors. To accommodate identified resource constraints, data collection priorities and methodologies were developed for the states to provide NAPAP with the data necessary for its research purposes. Emphases were placed on confirmation of emissions from large sources and quality control procedures during data collection in order to increase confidence in the data base. Financial and contractor support were provided to states identified as needing resources to meet the data and schedule requirements. The results were completely updated 1985 emissions estimates for the criteria pollutants established by NAPAP, representing the most complete National Emissions Data Systems (NEDS) inventory to date. NAPAP will use the 1985 NEDS as a primary origin of point source data for the 1985 NAPAP Emissions Inventory of sources thought to be acid precipitation precursors.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Pollution Data Acquisition Emission Inventories Precipitation (Meteorology) Acidification Quality Control	Pollution Control Stationary Sources Acid Rain	13B 14B 14G 15E 04B 07B, 07C 13H, 14D

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INTRODUCTION

The National Acid Precipitation Assessment Program (NAPAP), established by Congress in 1980, coordinates research on problems posed by acid deposition in and around the U.S. One priority research objective of this program is the development of a national inventory for 1985 of the anthropogenic and natural sources thought to contribute to emissions of acid precipitation precursors. The NAPAP Task Group on Emissions and Controls is currently working with the U.S. Environmental Protection Agency (EPA), State air pollution control agencies, the Canadian environmental protection agency (Environment Canada), and the National Oceanic and Atmospheric Administration to develop this inventory. The EPA and State air pollution control agencies have the primary responsibility for the development of anthropogenic point and area source emissions estimates in the U.S. for 1985.

Point source emissions estimates for the NAPAP inventory are collected and analyzed by the States and EPA through the National Emissions Data System (NEDS). NEDS is an existing data base developed in response to regulations (40 CFR, Part 51, Sections 51.321-51.323) which establish a system for annual reporting by the States to EPA of emissions inventory data for all point sources emitting more than 100 tons (90.7 metric tons) per year of criteria pollutants. Typically, States are asked to report up to 50 data elements annually for each point source of criteria pollutant emissions. As Table I indicates, the collection of these data for the approximately 250,000 processes in the U.S. which emit criteria pollutants is a difficult task. Prior to 1985, the resources required for collection of an accurate and comprehensive point source emissions inventory of this magnitude were not available.

To meet the objectives of the NAPAP 1985 Emissions Inventory, however, EPA and State air pollution control agencies developed a plan to significantly improve the quality and comprehensiveness of the NEDS point source data base. This paper discusses major elements of this plan and the assistance that U.S. EPA provided to complete the 1985 emissions inventory.

OBJECTIVES FOR THE 1985 NAPAP EMISSIONS INVENTORY

Prioritization and Standardization

To determine the most appropriate method of completing the 1985 inventory within the time frame requested by NAPAP, four major objectives were addressed:

- identification of high priority data elements for NAPAP research,
- identification of a time frame for inventory completion,
- identification of resources needed to complete the inventory, and
- identification of quality control procedures for the data base.

Table I. NEDS System: 1984 Stationary Point Source Profile[1]

State	Total Plants	Total Points	Point-SCC
Alabama	770	3,053	4,078
Alaska	312	587	1,181
Arizona	229	499	776
Arkansas	192	1,075	1,075
California	875	11,860	16,498
Colorado	885	3,635	4,384
Connecticut	261	1,850	2,403
Delaware	465	1,234	1,347
Dist. of Col.	69	198	269
Florida	275	1,791	2,756
Georgia	489	2,107	3,134
Hawaii	152	811	1,049
Idaho	270	727	1,056
Illinois	1,523	14,143	14,169
Indiana	1,583	4,985	7,794
Iowa	364	5,300	6,169
Kansas	2,176	7,992	9,659
Kentucky	517	2,804	3,964
Louisiana	454	6,274	7,324
Maine	595	1,206	1,318
Maryland	159	1,599	2,079
Massachusetts	2,605	8,023	9,968
Michigan	374	5,024	5,943
Minnesota	842	4,566	8,691
Mississippi	202	409	761
Missouri	636	2,550	3,355
Montana	113	934	1,176
Nebraska	1,151	3,110	3,328
Nevada	46	163	221
New Hampshire	59	260	331
New Jersey	458	23,554	23,557
New Mexico	364	1,337	1,337
New York	1,196	2,761	3,723
North Carolina	1,085	4,079	5,419
North Dakota	47	121	139
Ohio	1,433	5,405	6,899
Oklahoma	411	2,269	3,012
Oregon	139	933	933
Pennsylvania	1,442	4,232	5,556
Puerto Rico	1,206	2,155	2,588
Rhode Island	190	392	553
South Carolina	1,378	2,765	4,488
South Dakota	143	293	459
Tennessee	3,144	12,159	15,837
Texas	1,656	27,390	28,578
Utah	170	895	1,284
Vermont	21	159	184
Virginia	285	1,796	2,886
Washington	576	2,230	3,371
West Virginia	416	4,426	4,717
Wisconsin	1,095	5,118	7,615
Wyoming	150	821	1,054
Guam	21	176	245
Virgin Islands	15	49	54
GRAND TOTAL	35,684	204,289	250,744

With valuable assistance from the State and Territorial Air Pollution Program Administrators (STAPPA), EPA worked with State air pollution control agencies to develop a 1985 emissions inventory to meet these objectives.

As discussed below, EPA worked with the inventory community to define the priority data elements so that States would have the time and resources to acquire and submit the inventory to NEDS before the end of 1986.[2] A cooperative effort among NAPAP, EPA, STAPPA, and State personnel prioritized the inventory objectives to ensure delivery of data of the most importance to NAPAP, while EPA and State resource constraints to delivery of these data were identified. As discussed below, Table II summarizes the inventory data priorities by facility emission size and data elements that were established. Based on the results of the State survey, State resources were focused on data elements central to NAPAP research activities and assistance was provided through EPA to States to overcome problems in meeting the data requirements and schedules.[3]

NAPAP Data. Emissions data from point sources of five criteria pollutants are normally reported to NEDS: sulfur dioxide (SO_2), nitrogen oxides (NO_x), volatile organic compounds (VOC), particulates (TSP), and carbon monoxide (CO). As Table II indicates, highest priority was assigned to sources with emissions of SO_2, NO_x, and VOC. Sources of TSP were assigned to an intermediate priority level. For sources with these pollutants, the highest priority level was assigned to plants emitting at least 1000 tons (907 metric tons) during 1985. The next level of priority for these pollutants was assigned to plants emitting 100 to 1000 tons during 1985. Additionally, for plants emitting more than 2500 tons (2268 metric tons) of SO_2 or NO_x in 1985, States were requested to confirm these emissions with the sources.

A list of 14 priority data elements was assembled by NAPAP from the approximately 50 data items typically requested by the NEDS. These elements included actual emissions estimates and annual operating rates. For these two items, it was critical that 1985 data were reported. Other data elements necessary for the calculation of annual emissions estimates, such as Source Classification Code (SCC), estimated control efficiency, fuel sulfur content, and fuel ash content, were included. Additional key elements were location coordinates (UTMs), stack data, percent annual throughput, and normal operating schedule. These are necessary to acid deposition modeling activities. Fuel heat content, boiler design capacity, Standard Industrial Classification (SIC), and hourly maximum design rate composed the remaining priority data elements.

Confirmation. While not typically part of the NEDS data collection effort, confirmation of emissions data for large sources of SO_2 or NO_x was a high priority for the 1985 NAPAP point source inventory. The objective of the confirmation process was to obtain State and source agreement on emissions estimates. In many instances, this step improved the quality of data and increased confidence in the data base with respect to NAPAP, EPA, the States, and the sources by providing an additional review of large emissions sources. Where resources permitted, States extended this confirmation effort to smaller sources of SO_2 and NO_x, and large sources of VOC emissions.

Table II. 1985 NAPAP Emissions Inventory Priorities

Plant Size	Complete NEDS Submittal	Emission Estimates for SO_2	NO_x	VOC	TSP	CO	SCC	Control Equip/ Effic'y	Fuel/ Operat'n Data	Locat'n Data	Stack Data	Temporal Data	Other Key Data	Plants Confirm Emiss'n	SIC
I															
>500 TONS VOC & >1000 TONS OTHERS	H	H	H	H	M	L	H	H	H	H	1	H	M	2	L
II															
>100 TONS ALL	M	3	3	4	M	L	H	3	3	H	M	L	L	L	L

PRIORITY: H=HIGH M=MEDIUM L=LOW

1 - HIGH for stacks > 100 feet; LOW for stacks < 100 feet.

2 - HIGH for plants with emissions of SO_2 and NO_x > 2500 tons.

3 - HIGH for combustion sources; MEDIUM for other industries.

4 - HIGH for petroleum refineries and chemical processors; MEDIUM for other industries.

Confirmation was accomplished in one of two ways. The first and predominant method involved the State providing emissions estimates and calculations for each unit process (SCC) to the facility contact for review. After review of the State estimate, the source indicated the accuracy of the estimate or provided an alternative estimate that was more accurate. In case of disagreement, the source provided alternative calculations for its estimate. State and source were to attempt to reach agreement on the appropriate emissions estimate, but ultimate responsibility for selecting the most accurate estimate rested with the State.

A second method involved requesting the facility to provide emissions estimates and supporting data for each unit process at the time of the yearly inventory. The State would then review the estimate and accept or reject it. As above, the State retained responsibility to submit the most accurate estimate.

A confirmation report was prepared by each State, or by the contractor assisting the State, for each facility emitting SO_2 or NO_x of at least 2500 tons in 1985. This report consisted of a cover memorandum from an appropriate State agency official and a table representing all facilities meeting the criteria. The table contained source name, NEDS ID number, actual 1985 SO_2 and NO_x emissions, and the confirmation status. This status was 1) agreement of State and source, 2) disagreement, State estimate, 3) disagreement, source estimate, 4) no comment by source, or 5) no confirmation attempted. Provisions were made for reporting the difference between major facility-level conflicts and minor point-level disagreements.

Quality Control. For 1985 emission submittals, EPA regional offices were responsible for working with State air pollution control agencies to perform quality control (QC) of NEDS data on computer tape.[1] The NE061 QC edit routine was specifically revised for this purpose. In many cases assistance was provided to run these QC checks (NE061) on State data prior to submittal to the regional office. The purpose of these checks was to identify missing and questionable data so that the States could correct errors and validate questionable, but correct, data.

This preliminary QC routine (NE061) identifies two types of problems in the data. Data can be rejected due to incorrect coding; these are called fatal errors because if these errors exist, all data for the point will be rejected by the edit program. These are the most serious errors and include invalid NEDS identification codes (i.e., the alphanumeric code that uniquely identifies each plant and point in the NEDS point source file), invalid estimation method codes, or invalid SCCs. Warning messages identify the second type of problem, questionable data. Such data may include missing emissions estimates; questionable or incorrect stack and location parameters; and inconsistent design, operating, and emissions parameters.

As an additional QC procedure, NEDS data for electric utilities were compared to U.S. Department of Energy (DOE) reports for utility companies rated at 100 MW or more. These reports are mandated by law and contain data similar to NEDS requirements. Approximately 500 fossil fuel-fired electric plants are covered by these DOE reports. This check was especially useful to the inventory because electric utilities contribute a large percentage of U.S. SO_2 and NO_x emissions. Significant differences between NEDS and these DOE reports indicated potential errors and the need for resolution of the data.

A number of States requested assistance in responding to these preliminary QC checks. Errors were compared with raw inventory data. Questionable data were investigated to determine if changes were warranted or if the data could be validated as correct. The responses to QC checks were documented for future use and transmitted to the regional office.

Tape Preparation. After the development and QC review of the 1985 inventory data, States coded the data for computer entry and submitted the data on a magnetic tape to the EPA regional office in NEDS card image format for sources emitting at least 100 tons. For 1985, States were encouraged to submit a tape containing new inventory data for all point sources. Submitting a complete set of 1985 emissions data in this fashion eliminates data which are inaccurate due to obsolete information regarding facilities and emissions estimates.

Workshops. An important early step in assembling an adequate and consistent data base was the establishment of a common methodology for data collection, emissions estimation, and QC at the State level. This was important for two reasons. First, the resulting State data bases would be developed on a nationally consistent basis. Secondly, QC procedures could be developed to build QC directly into the data collection process. The information describing this standardization procedure was recorded in several reports distributed to State personnel and discussed in two workshops for State and contractor efforts.

The first workshop, held in October 1985, was for EPA, NAPAP, and State personnel. Companion manuals were produced addressing data collection procedures,[4] confirmation status reporting,[5] hydrocarbon emission estimation (reactive vs. nonreactive),[6] and 1985 utility data[7] to aid in comparison with NEDS utility data. A second workshop, specifically for contractors assisting the States, was held in May 1986. These workshops and companion manuals provided the States and contractors with a common methodology for collecting, coding, editing, and transferring the data for NAPAP.

State Assistance

While the workshops were being developed, EPA worked with STAPPA and State air pollution control agencies to define resource constraints that had to be overcome for the 1985 inventory. Because of the schedule and data quality objectives, most States requested financial or contractor assistance

to be able to provide a 1985 inventory on schedule. As a result of State surveys, EPA provided financial and contractor support during 1986. Most States identified one or more of these five areas in which to utilize this assistance:

- o development of inventory data,
- o confirmation of emissions estimates with the largest sources,
- o application of QC procedures,
- o encoding of inventory data for delivery to EPA, and
- o changing these data in response to problems identified by QC procedures.

Assistance in developing inventory data covered a wide range of activities, depending on State needs. Conducting an inventory from start to finish in a NEDS-compatible format entailed four steps:

- o identification of facilities,
- o questionnaire development and distribution,
- o codification of resulting data, and
- o development of a NEDS-compatible computer tape.

Contractor support in the first two areas was requested infrequently. While a few States required this kind of help, most have been able to develop the required inventory data with their own staffs. When assistance was supplied, however, it typically focused on identification of facilities to be inventoried. This effort relied on previous inventories, expertise from State personnel responsible for air pollution sources, and/or an evaluation of SICs and number of employees. In general, State expertise was sought by traveling to the central air pollution control agency, working with State personnel, and accessing current files. Working with a designated State inventory contact, a questionnaire was devised which requested all key NAPAP data elements, actual emission estimates, and any additional data of interest to the State. Facility response was excellent, due in part to efficient State follow-up. This contact allowed missing or questionable data elements to be reviewed directly with the facility, and prompt initiation of applicable confirmation procedures with the facility, as discussed previously.

Most States required assistance to translate the raw data returned from facilities to a NEDS-compatible format (i.e., NEDS forms, State Emission Inventory System, or microcomputer data base) and to complete the necessary QC procedures. Because of the diversity of inventory formats among States, carrying out the standardized methodology for data coding was a significant challenge. One efficient method of data coding was to use a microcomputer and

software developed for this purpose. The software allowed a user with an IBM™ or compatible PC to load data into dBase™ data base management files through a series of menus. These files were then used to produce a magnetic tape in NEDS card image format.

Often a tape was prepared for the State under this assistance effort. After QC editing, the tape was submitted either to the region or to the National Air Data Branch (NADB), at the region's discretion. Where assistance had been allocated to complete NE061 editing, a very high quality data tape resulted without rejections and unvalidated warning messages. This significantly reduced later quality assurance (QA) effort and time at the State level.

STATUS OF 1985 STATE ASSISTANCE

To evaluate the outcome of the 1985 inventory, it is necessary to compare it to those developed in prior years. In general, previous years' NEDS data have been less complete than the 1985 inventory. For example, typical NEDS data represent submissions by 34 States and, of these, only 10 States submit substantially current data. Many inventories contain significant data omissions and much of these data, when submitted, are delivered late.

The objectives of the 1985 inventory were to develop an accurate and complete inventory for NAPAP high priority data elements by the end of 1986. Currently, these objectives have been substantially accomplished. The 1985 emissions inventory will contain both actual 1985 emissions estimates from all States and additional data that meet the requirements for high priority NAPAP inventory elements. A few States will not be able to supply selected NAPAP data elements because of State confidentiality restrictions. Inventory data submittals have been obtained from all but three States, and these submittals are expected soon.

SUMMARY

NAPAP is utilizing the 1985 NEDS submittal to develop a point source inventory of air emissions thought to be acid rain precursors. This effort is being coordinated among NAPAP, EPA, STAPPA, and the States. Early in the effort, it was recognized that a high quality data base was necessary and that additional resources were needed by the States to furnish a complete, high quality data base. Financial and contractor assistance requirements to the States were assessed and a program to implement the inventory begun. These efforts have resulted in a 1985 NEDS national inventory which is the most accurate and comprehensive ever compiled. The success of this effort reflects both the strong cooperation among EPA, the States, and STAPPA, and the financial assistance provided to surmount State resource limitations.

Prior to the 1985 NAPAP Emissions Inventory preparation, the participants developed priorities targeting resources for collection of data from the most significant sources and precursors. Highest priority was attached to data from facilities emitting more than 1000 tons (907 metric tons) of SO_2 or NO_x in 1985, or 500 tons (454 metric tons) of VOC. Further, coordination and standardization of data collection and coding methodology were implemented through State and contractor workshops and guidance manuals.

Four areas of State assistance needs were identified. Funding from NAPAP and EPA provided States additional resources or contractor effort in these areas:

- o inventory development,
- o confirmation of emissions with large sources,
- o edit QC checks,
- o codification of inventory data into a NEDS-compatible format, and
- o magnetic tape preparation.

Previous NEDS inventories have suffered because of lack of resources at the State level, incomplete coordination of the national effort, and the existence of incompatible computerized State data bases. Most States have not been able to make complete annual inventory submittals. However, this effort has established updated 1985 NEDS inventories for all States.

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